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Attorney Docket No. 94-552

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Title: MANUFACTURING RAISED ELECTRICAL CONTACTS HAVING CONTROLLED GEOMETRY

Serial No.: 08/152,812

Filing Date: 11/16/93

Inventor: KHANDROS

Examiner: Knapp, J.

Art Unit: 3205

To: Commissioner of Patents and Trademarks
Washington, D.C. 20231

AFFIDAVIT

COMES NOW THE AFFIANT AND, FIRST BEING DULY SWORN, AVERS AS FOLLOWS:

1. I, BENJAMIN N. ELDRIDGE, am a US citizen residing at 11 High Ridge Rd., Hopewell Junction, NY 12533.

2. I was granted a Bachelor of Science degree in Electrical Engineering from Union College (Schenectady, NY) in the year 1982.

3. I was granted a Master of Science degree in Physics from Rensselaer Polytechnic Institute (Troy, NY) in the year 1984.

4. Between the years 1985 and 1994, I was employed by IBM (Research Division, Yorktown Heights, NY), where my general duties included surface analytical research and, from 1987 onward, my work was specifically directed to analysis of organic thin films on surfaces (predominantly metal surfaces).

5. In 1991, I co-authored a paper entitled COPPER CORROSION WITH AND WITHOUT INHIBITORS (appended hereto), published August 1991, Journal of the Electrochemical Society (J. Electrochem. Soc.), which specifically describes the growth and characterization of BTA (benzotriazole) films on copper.

6. From the year 1994 to present, I have been employed at Form Factor, Inc. (Elmsford, NY), assignee of the above-referenced patent application, where my duties include software design and development related to the testing and analysis of products under development at Form Factor, Inc..

7. Based on my experience and personal knowledge, I would be considered competent to testify as to the properties of metal-organic compounds and composites, specifically metal-BTA compounds.

8. I have reviewed U.S. Patent No. 4,821,148, entitled RESIN PACKAGED SEMICONDUCTOR DEVICE HAVING A PROTECTIVE LAYER MADE OF A METAL-ORGANIC MATTER COMPOUND.

9. Based on the above, I hereby aver that:

(a) the aforementioned U.S. Patent No. 4,821,148 is directed to forming metal-BTA compounds on metals, and is not directed to metal-BTA composites;

(b) a copper-BTA film, such as is described in the aforementioned U.S. Patent No. 4,821,148 is a polymeric structure consisting of chains of copper and BTA, wherein there is no free metallic copper. The lack of free metallic copper is confirmed by X-ray photoelectron spectroscopy, which shows that the copper is in its Cu^{+1} oxidation state, with Cu-N bonds to nitrogen atoms in the azole ring of the BTA molecule. Cu-BTA polymerization is demonstrated by TOF-SIMS, which has the appearance of

long chain molecular ions with increasing Cu-BTA film thickness.

(c) the aforementioned U.S. Patent No. 4,821,148 describes forming metal-BTA compounds with copper, aluminum and silver. No mention is made of forming a gold-BTA compound which, to my knowledge, would not be feasible.

(d) the aforementioned U.S. Patent No. 4,821,148 is directed to forming metal-BTA compounds over bond wires and bonds, for the express purpose of imparting damp-proofness to the bond wires and bonds;

(e) metal-BTA compounds such as are described in the aforementioned U.S. Patent No. 4,821,148 contain no metallic species in the unoxidized state, and would exhibit extremely low conductivity, commensurate with what would be considered to be an insulator (or insulating coating), although metal-BTA compounds may not be the best choice for an electrically insulating coating; and

(f) metal-BTA compounds such as are described in the aforementioned U.S. Patent No. 4,821,148 would not be suitable for permitting electrical connections to be made to the bond wire or to any terminal (or the like) upon which a metal-BTA compound has been formed, since they are poor conductors. Making electrical connections would require a metallic coating (such as by plating), wherein the metal is in its free, conductive state.

10. In direct contrast to the teachings of the aforementioned U.S. Patent No. 4,821,148, metallic platings (or other techniques of applying a coating to a wire), such as nickel, are ideal for permitting electrical connections to be made to a bond wire or to any terminal (or the like) upon which such a metallic plating has been applied.

11. The teachings of the aforementioned U.S. Patent No. 4,821,148 are inapposite and antithetical to applying a conductive, metallic coating to a bond wire.

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BENJAMIN N. ELDRIDGE DATE

The affiant, BENJAMIN N. ELDRIDGE, personally appeared before me, the undersigned notary and, first being duly sworn, executed this affidavit.

EXECUTED THIS 13th DAY OF February, 1995

STATE OF NEW YORK }
COUNTY OF Wayne }

THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME THIS 13th DAY OF February, IN THE YEAR 1995, BY BENJAMIN N. ELDRIDGE, WHO IS PERSONALLY KNOWN TO ME, OR WHO HAS DEMONSTRATED BY COMPETENT EVIDENCE (DRIVER LICENSE NO. 590 690 577) TO BE THE PERSON SUBSCRIBING/ACKNOWLEDGING THIS INSTRUMENT.

WITNESS MY HAND AND OFFICIAL SEAL.

(Notary's signature)

seal (optional)